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AUTHOR Budoff, Milton
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ABSTRACT

The differences in learning potential among educable adolescents is discussed in terms of high scorers, those who learned to solve problems on the Kohs test while doing the first trial, gainers who experienced difficulty but showed marked improvement following tutoring, and nongainers who did not improve after tutoring. The reliability of the Kohs block designs is indicated and the relation of learning potential status to social, demographic, school, and test variables is discussed. Evidence is given to support the suggestion that severe social deprivation during or prior to school age tends to be associated with a higher proportion of nongainers, while less severe disadvantage results in higher proportions of gainers and high scorers. The latter groups are portrayed as more educationally rather than intrinsically retarded. (RJ)

STUDIES IN LEARNING POTENTIAL

SOCIAL AND TEST DATA CORRELATES OF LEARNING POTENTIAL STATUS IN ADOLESCENT EDUCABLE MENTAL RETARDATES

By

Milton Budoff

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Research Institute For Educational Problems
12 Maple Avenue Cambridge, Massachusetts

SOCIAL AND TEST DATA CORRELATES OF LEARNING POTENTIAL STATUS IN ADOLESCENT EDUCABLE MENTAL RETARDATES[1]

Milton Budoff

Research Institute for Educational Problems[2]

Budoff and his associates (1964, 1965, 1967, 1969) have demonstrated the relevance of an assessment strategy supplementary to the individual intelligence test which seeks to determine ability to reason through use of a nonverbal reasoning problem (Kohs Block Designs). The essence of this assessment strategy is to allow the severely school failing child the opportunity to learn principles relevant to solution of the reasoning problems in a supportive individual session. An individually administered posttest permits the subject to demonstrate whether he has profited significantly from the training as compared with his pretest score. Intelligence has been defined operationally, then, as the demonstrated ability to profit from the learning experience, or his learning potential. In this assessment procedure, the child is seen for a pretest session followed by a period of individual tuition (usually no more than one hour in duration) and two posttests, one day and one month following tuition. [See Budoff & Friedman (1964) for a more detailed presentation of the procedure and a report of a replication (Budoff, 1967)].

Three patterns of response to this learning potential assessment task have become evident when the procedure is administered to

educable mentally retarded (EMR) adolescents. Some students, who were designated high scorers (HS), solved difficult nine or sixteen block problems on the initial administration of the Kohs designs; others, gainers (G), had difficulty with the problems on the pretest administration but showed marked improvement following tuition as was reflected in higher posttest scores; while other students, non-gainers (NG), also experienced difficulty on the pretest but did not markedly improve their scores following tuition. A gainer was defined as a student who solved four or more designs on the post--tuition sessions than on the pretest trial, an increase in score greater than three times the mean increase of the noncoached controls, which was 1.2 designs. Nongainers were those coached students whose pretest to posttest change was less than four designs.

The original study (Budoff & Friedman, 1964) and a replication (Budoff, 1967) were carried out with post-school age adolescent institutionalized patients. The major problem in understanding the significance of the improvement in performance of the gainers and high scorers was whether the increased competence indicated a more general ability to reason, or whether the improvement was task--specific. Psychometric and learning measures were administered to the coached samples. There were no differences in CA, Binet IQs, or Wechsler Verbal Scale IQs (VIQ) as a function of learning potential status. However, there were highly significant differences among these groups' Wechsler Performance Scale IQs (PIQ) and in their scores on Raven's Progressive Matrices. For example, gainers and high scorers tended to have higher PIQs than VIQs; these usually fell in the dull-normal to average IQ ranges, their Raven's Matrices Scores fell above the fifth percentile, i.e., in the same IQ ranges.

They also tended to solve a double alternation and paired associates learning task more rapidly and with fewer errors than nongainers (Budoff, 1967).

In short, following coaching, some learned, some did not, while others learned how to solve the problems while doing them on the first trial, much as higher IQ children do. While these findings do not contradict the IQ based prediction that these children are poor academic risks, they suggest that high learning potential status EMRs (gainers and high scorers) are educationally rather than mentally retarded.

Budoff and Meskin (1969) demonstrated the educational relevance of the learning potential distinctions when they evaluated school learning in a minimally verbal curriculum. Using a classroom laboratory science unit, they demonstrated that learning potential status, not special or regular class placement, predicted level of understanding of simple concepts of electricity following the opportunity to work with and manipulate dry cell batteries, flashlight bulbs and wire, during 25 hours of classroom instruction. The pre/post evaluation procedure was designed to require little verbalization, as was the course of study. Nongainer EMRs demonstrated very little increased understanding of electricity following teaching, whereas the gainer and high scorer EMRs' level of understanding could not be distinguished from their regular class counterparts. This was especially true when they were compared with the low achieving higher IQ peers, i.e., other marginal students.

In light of the data available demonstrating the utility of the learning potential distinction with psychometric, reasoning, and learning types of tasks, and in actual classroom learning, this

paper presents data pertinent to the test instrument itself[3] and to social and test correlates of learning potential status. The data are based on a sample of 383 community special class students, ranging in CA from 9 to 19 years (median CA--14 years) and in IQ from 55 to 85. This population is composed of the total enrollments in the educable special classes in several small towns and cities in Massachusetts during specific school years, and in several junior high schools in Boston.[4] In practice, children are placed in special classes for the educable retarded (EMR) in Massachusetts largely on the basis of an individual intelligence test score, usually the Stanford Binet, which is between 50 and 79 IQ. Social and test data were generally collected by project staff directly from the students cumulative record folder, or from his teacher.

Of this sample of 383 Ss, 22% (80 Ss) of the children who were presented the block designs on the pretest solved difficult nine and/or sixteen block problems and were classified as high scorers (HS); 57% (140 Ss) had initial difficulty with the problems but had markedly improved posttest scores and were considered gainers (G); and about 40% (151 Ss) did not markedly improve their scores following coaching and fell into the nongainer (NG) category.

Stability of Gain on the Learning Potential Task

Kohs block designs are administered on the day following tuition, and a delayed posttest approximately one month later. The premise underlying this procedure was that there might be a large increment immediately following tuition, but this increment might be reduced considerably after an interval of one month to about midway between pretest and immediate posttest score. This rarely occurred. Few Ss demonstrated even a small decline on the delayed posttest.

More interesting, there was a tendancy for the scores of some EMRs to increase markedly on the delayed posttest, and LP status was determined by the highest score obtained on a post-tuition trial.

Table 1 summarizes the intercorrelations of designs correct scores on pretest, and immediate and delayed posttest following tuition. The intercorrelation of .764 between the pre- and immediate posttest on the block designs for the community school age sample indicates that those Ss who solved some designs successfully initially did tend to solve more designs following coaching than those who solved few or no designs on the pretest. As hypothesized, there was some instability. This was considerably reduced by the delayed retests, one and six months following coaching. The average intercorrelation (.900) is high and stable. The intercorrelations for an institutionalized adolescent sample are similar and slightly higher. [5]

Insert Table 1 about here

Reliability of the Kohs Learning Potential Procedure

The reliability of successive administrations of the Kohs block designs is indicated by the intercorrelations of initial, immediate and delayed retests of the block designs, when these correlations were computed from the scores of the noncoached sample of EMR institutionalized subjects who had served as controls in the initial studies (Budoff & Friedman, 1964; Budoff, 1967). The

correlations of .701 between pretest and immediate retest without coaching indicate some unreliability as some of the Ss did improve their scores merely with the opportunity of practice. The correlation of .953 between immediate and delayed retest (a one month interval), and on a smaller sample, six months following coaching (r = .866), indicates little further change in score as a function of practice. On this task, then, there is stability to the block design score after one retest, with or without tuition. A small sample of community special class school age students yielded correlations of similar magnitude.

The Relations of Learning Potential Status to Social, Demographic, School, and Test Variables

The means and standard deviations for selected social, demographic, school and test variables subdivided by learning potential status are presented in Table 2.

Insert Table 2 and 3 about here

Differences between these means were tested by one way analyses of variance, and the significant differences are indicated. Table 3 presents the correlations between the variables, and with learning potential status[6]. Only those associated with learning potential status will be discussed.

1. Social Class An estimate of social class was obtained by rating the occupation of the principal wage earner as given in the school record by Turner's classification (Turner, 1964).

> The first three categories are the standard divisions among manual laborers and menial-service workers (semi- and skilled workers). The fourth category isolates low-level white collar workers, including the behind-the-counter salesclerk. This, we believe, is the group which was once the bottom of the upper half of the occupational scale, but which has now been effectively cut off by the requirement of higher education from entry into most of the higher brackets. The fifth category is the repository of the old small-entrepreneur group. Included here is only the business small enough for the owner to keep an active hand in all its operations. (Turner, p. 247)

Categories 6 - 9 include the higher levels of middle and upper class occupations.

When the learning potential groups were classified by occupational rating of the principal wage earner, the sample was heavily biased in the blue collar categories (1 - 3) which included 63% of the subjects. Twenty-five percent fell into the lesser white collar category. Only 12% (36) qualified for the higher level occupations (categories 6 - 9) and more than half of these were nongainers (56%); only 14% were high scorers. By contrast, 42% (78) of the blue collar workers' special class children were nongainers, 33% were gainers, and 25% high scorers ($\underline{X}^2_{4df}$ = 9.398; $\underline{p} < .05$). The proportions for the children from lesser white

collar families are 30%, 50%, and 20% for nongainer, gainer, and high scorer, respectively. The proportion of high scorers increased from more to less privileged occupational categories.

The social background biases in the sample are a function of a markedly low incidence of mild and moderate retardation among middle class populations (see President's Committee on Mental Retardation, 1962). As might be predicted from the learning potential argument, the sections of the population which would tend to be proficient with nonverbal rather than with verbal reasoning materials are to be found among the blue collar populations in the cities, and among non-English speaking immigrants, e.g., French Canadian, Puerto Rican, and such underprivileged rural populations as American Indians, Southern Negroes, and Appalachia Whites, etc. The classes studied in the urban schools tended to draw their students from low income areas. In the smaller towns in which the total sample of EMRs was used, the proportion of children from the low income backgrounds was high except for one white collar suburb. Even in this suburb, which had only four EMR classes for the entire age range in a large and progressive school system (total population of the town is about 100,000) the mean occupational rating was 4.111± 2.32 (i.e., lesser white collar); the proportion of nongainer EMRs was high among the clearly middle class children, and the children from the few blue collar districts in the suburb were overrepresented in the classes.

The lower the occupational rating of the principal wage earner, or social class, the indices typical of a poor family appear. The significant correlations, while low in magnitude,

indicate that the lower the social class the more likely there is no father at home (r = -.169, $p < .01$), more children (r = -.165, $p < .05$), and that the child is not living with both parents at home (r = -.181, $p < .01$). Interestingly, the poor children tended to be placed in special class later than children from more privileged backgrounds (r = -.205, $p < .01$), were in the special class for fewer years (r = .206, $p < .01$), and their ability as indicated by the Raven's Progressive Matrices test was higher (r = -.221, $p < .05$).

2. Birthplace EMRs born in the southern United States tend to be slightly over-represented as nongainers (47%), while those EMRs born in countries other than the United States tend to be markedly under-represented (17%) as nongainers as compared with EMRs born in New England (40%). Immigrant children tend to fall inthe gainer (39%) and high scorer (44%) categories as compared with southern born EMRs (31% and 22% for gainers and high scorers, respectively), and with those EMRs born in the northeastern United Stated (40% and 20%, for gainers and high scorers, respectively). The disproportions among the southern born EMRs, when those born in the Northeast were taken as the criterion distribution, is probably due largely to the biases against Negro children's responses to the block designs. The learning potential procedure, however, does seem to describe the latent ability that the immigrant child has, especially when he has a language problem as well. The majority of the immigrant children in this latter sample were French Canadian (X^2_{4df} = 12.788, $p < .05$).

3. Living Arrangements of the Child Living in exceedingly difficult circumstances is associated with an increased incidence of nongainers. Thus, children who are not living with either biological

parents, e.g., in foster homes, with a guardian or relative, tend to be nongainers (75%); whereas children from one or two parent homes (whether natural or by marriage) show an incidence of between 35% to 45% of nongainers ($\underline{X}^2_{6df} = 12.788$; $\underline{p} < .05$). As the living situations become less extreme, e.g., households containing one parent or both biological parents, there is an increased proportion of students attaining gainer and high scorer status. Similarly, when the distribution of father-present or father-absent is examined by learning potential status, a higher proportion of high scorers and gainers is associated with homes in which a father is present. Father-absent homes tend to produce a higher proportion of nongainers ($\underline{X}^2_{1df} = 3.667$; $.10 < \underline{p} < .05$), but this proportion is lower than that for children placed away from their home. A similar result is true when the mother is present or absent in the home ($\underline{X}^2_{1df} = 5.236$, $\underline{p} < .05$).

4. Other Social Factors. Positive correlations were found between whether mother and father do not speak and/or write English and learning potential status ($\underline{r} = -.167$ and $-.169$ for mother, respectively, $\underline{p} < .05$). While this parental language problem may handicap the child's scholastic aptitude score (Binet-type IQ) and his school performance, and often results in assignment to special class, a higher proportion of these children scored in the high able (LP) categories indicating more ability than expected based on past school performances. Thus, if mother or father does not speak or write English, the higher the pretest block design score ($\underline{r} = -.201$, $\underline{p} < .01$), immediate posttest score ($\underline{r} = -.173$, $\underline{p} < .05$), and gain score ($K_3 - K_1$) ($\underline{r} = -.253$, $\underline{p} < .05$).

Gainers and high scorers tend to come from large families (r = .242, p < .01), have more older siblings (r = .201, p < .01); and younger siblings (r = .160, p < .05).

5. Learning Potential Status and Physical and Medical History There was little evidence in the school records of any significant incidence, in absolute terms, of visual or hearing problems, accidents, or unusual diseases among those community special class children.

A small sample of Ss with known or suspected brain involvements was collected to test the response of these particular types of EMRs to the Kohs learning potential procedure. The sample was divided into those Ss for whom there was definite evidence of cerebral involvement based on a reported physical or neurological examination, and those for whom the possibility of cerebral involvement was merely suggestive, i.e., the information had been obtained informally by teachers, was based on their impressions, on behavioral observations made by the project examiners, or statements made in the school records which lacked confirmation by a medical report. There was no relationship between socio-economic status and incidence of cerebral involvement with the limited sample of cases available. It has been frequently observed that biological involvements that result in retarded functioning tend to strike with the same relative incidence among all social strata of the population.

Ss with established cerebral involvement, but not merely seizures, tended to be nongainers (8 of 9 Ss); while among the questionable cases, there was a smaller proportion of nongainers (6 of 9 Ss) (See Budoff, 1965, for more extended discussion and summary table).

This incidence of nongainers among persons with cerebral involvement is considerably higher than that predicted from the studies of special class students with no evidence of brain injury.

6. Learning Potential and Chronological Age Chronological age (CA) is related to performance on the Kohs learning potential task ($\underline{X}^2_{11df} = 43.152$, $\underline{p} < .001$). There were significant correlations between CA and pretest, immediate, and delayed posttest scores on the Kohs task ($\underline{r} = .204, .254, .254$, $\underline{p} < .01$, respectively). As Figure 1 indicates, 60% of children 12 years of age or under are nongainers; only 10%, high scorers. By 15 years of age and older, the samples consist approximately of 1/3 gainers, nongainers and high scorers.

Insert Figure 1 about here

This finding is probably a function of developmental factors involved in solving block designs. Younger children solve fewer block designs than older children. This is illustrated in Figure 2 which presents the mean number of designs correct on an initial administration of the enlarged Kohs design cards used in the learning potential procedure with normal children, from low income urban backgrounds, 9 to 14 years of age. As the CA of the child increases, so does the mean number of designs correct. The young child has a minimal possibility of attaining high scorer status because he must

be able to visually organize quite difficult designs. Gainer status can be attained more readily since the criterion of improvement of four or more designs can be met, especially if one achieves minimally on the pretest. However, young children seem to experience marked difficulty organizing the more difficult four block problems, even following tuition. In this regular class sample there was a significant correlation with reading achievement scores (r = .284, $p <$ .01) but not with group administered IQ tests (r = .018). Additional studies of the effects of tuition will indicate whether adequate school learners do benefit markedly from this procedure. It should be noted that small samples of regular class students (IQ > 80) were administered the Kohs training procedure for inclusion as control groups in a study (Budoff & Meskin, 1969). Of these 36 students, 25% attained nongainer status, largely among low achieving students, suggesting that the ability to profit from experience would be a worthwhile determination for low achieving school children whose IQs pass the magic 80 IQ barrier.

Insert Figure 2 about here

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7. Learning Potential and Sex Girls tend to be over-represented, as compared with boys, in the nongainer status (47%: 33%) and boys tend to predominate as gainers and high scorers (38% boys: 29% girls and 28% boys: 10% girls, respectively) (χ^2_{2df} = 21.60, $p < .001$). Sex correlated negatively with pretest scores (-.257, $p < .01$), learning potential status (-.235, $p < .01$), and positively with reading achievement (.212, $p < .01$). Almost twice as many boys

as girls were present among the non-organically impaired EMRs in this community special class sample. Clearly, boys responded better to the block design task than the girls, which may be due to the manipulative nature of the task. But what also may be evident from the school placement procedure in the towns which contributed most heavily to this sample, is that girls must be a more serious problem to be referred for special class placement.

8. Learning Potential and Race A further bias in the use of the Kohs learning potential procedure is reflected in the relative performance of the black and white EMR samples. Though based on a small sample (N = 70), more than half of the black sample (56%) fell in the nongainer category; 33% and 11% attained gainer and high scorer status, respectively. This compares with the distribution of the white EMR sample (37.5%,38.5%,and 24% for nongainers, gainers, and high scorers, respectively).

9. Age Placed in Special Class There were no differences between the means of the learning potential groups re: the age first placed in special class for EMRs. However, when the distributions by learning potential status of the larger white samples were compared, students placed later in special class (after 9 years of age) tended to be gainers and high scorers (by a factor of 3:1 and 2:1 respectively), while those placed earlier (under 8 years), tended to attain high able status (gainer and high scorer) about as often as they attained low able (nongainer) status during the adolescent years.

Age first placed in special class was correlated negatively with social class (r = -.205, p < .01) indicating that the lower the

age of placement, the higher the social class. But the distribution by social class is attenuated since the families of 85% of the sample fell in the lower socio-economic levels. Similarly, those placed early tended to be born in the Northeast (r = .229, p .01), lived longer in urban areas (-.270, p .01), lived in intact families (r = .131, p .05), and tended to have suffered more accidents (-.162, p .05).

Children placed in special class early in their school career may be different in some salient features from those placed later. They tend to be from better homes economically, and not to suffer from the effects of economic disadvantage when compared to children placed later in special class.

10. Number of Years in Special Class There were no differences between the means for the learning potential groups for this variable. As with the CA first placed variable, the correlations with social class (.206, p .01), birthplace (-.265, p .01),number of years lived in Northeastern urban area (.452, p .01) and number of accidents or operations recorded (.277, p .01) suggests again that children who spend the longest time in special class are not economically disadvantaged, but may represent instances of physically or psychologically damaged children.

11. Psychometric Findings Latest individual intelligence score, whether a Stanford Binet or a WISC Full Scale IQ (FIQ) is clearly related to learning potential status. Nongainers' mean IQ was under 70, gainers' IQs about 74, and high scorers' mean IQ was 75.35 for a Binet and 79.50 for the WISC FIQ. As would be expected, latest IQ was also significantly correlated with the other psychometric and achievement tasks (See Table 3).

The clearly significant differences in mean IQs are not interpretatively significant, however, in that they would not result in different administrative assignment for these children within the school setting. What is interesting about this finding is that the IQ scores of high scorers, gainers, and nongainers were ranked in accordance with the estimate of ability made by the learning potential procedure.

Two and three Binet IQ scores were available for small numbers of students in the sample. Examination of the means indicated no significant differences across the test administrations or within learning potential groups over time, or on the interaction of LP x successive tests. The curves when plotted, however, did indicate support for the LP argument, namely, high scorers tended to improve their scores (75 to 80 IQ), while gainers had a smaller decline (74 to 70 IQ) than the nongainers (70 to 64 IQ). Also, the increase for the high scorers places them at the upper margin of the borderline range, while the nongainers' mean places them more clearly within the mildly retarded range. The results with the gainers suggests that this group might be mixed regarding potential ability (See Figure 3). These results must be considered preliminary because of the very few Ss.

Insert Figure 3 about here

When one compares the latest Binet IQs with the mean scores obtained for the Wechsler Verbal Scale IQ (VIQ), there are no differences evident (See Table 2). But as Table 2 indicates, there are substantial differences in means when either set of verbal test scores is compared with the Wechsler Performance Scale IQs (PIQ). Whereas there are no differences between VIQs and PIQs for nongainers, the PIQs for gainers and high scorers are substantially higher (80.689 and 88.800, respectively). In similar fashion, Raven's Progressive Matrices Scores (Sets A, B, C, D, E) differed significantly. High scorers, gainers, and nongainers, in that order, had lower mean raw scores.

12. Achievement Test Data There were no significant differences in tested reading achievement levels for the three LP groups (average mean grade equivalent was 3.53) but levels of arithmetic achievement were positively related to learning potential status. The absolute differences in mean arithmetic scores were about one grade level; nongainers evidenced the lowest scores, gainers' mean scores were one-half grade higher and high scorers' scores one grade level higher.

13. Paired Associates Learning Similarly, differences in ability to learn a ten-picture paired associates (PA) learning task was evident. When presented in the usual PA paradigm, high scorers showed fewest errors, while gainers and nongainers made a similar number of errors ($F = 3.008$, $p = .055$). An additional test of how well these students learned the picture pairs was obtained by presenting the response item in the pair as the stimulus, and requesting in the anticipatory interval "the picture that goes with it" some days later. The order of proficiency on this backwards

paired associates task was in the predicted direction; high scorers and gainers tending to give fewer mean numbers of errors than non-gainers, but the differences indicated did not attain the expected significance level (F = 2.048, p = .136).

14. Characteristics of Response to the Kohs Learning Potential Procedure Table 2 indicates the expected differences in proficiency in solving the Kohs Block Designs. While there was no difference between gainers and nongainers on the initial administration, there was a marked difference following the coaching procedure, since the difference in designation between nongainer and gainer was based on response to coaching (the required difference between pre- and post-training administrations was four designs). High scorers, by contrast, were defined by their solution of a difficult nine block problem, and the mean score reflects this competence[6]. Gain scores, of course, reflect the definition of learning potential status.

Initial Kohs block design scores tend to correlate least well with Binet type scores (latest IQ, .404; 2nd latest IQ, .357; 3rd latest IQ, .349; WISC Verbal Scale IQ, .363). They correlated higher with later block design administrations (.764 and .737 for immediate and delayed posttest, respectively) and with Wechsler Performance IQ (.616), and Raven's Matrices (.589) ($p<.01$ for these correlations).

The same relationships were evident for the immediate and delayed posttest scores; the major change is that the correlation with latest IQ rises to near .50 for the delayed posttest scores.

Discussion

The learning potential procedure results in a stable and reliable assessment of increased ability to reason in solving the block designs. The data for adolescent students in special classes for the educable mentally retarded essentially agree with the findings previously reported for institutionalized late adolescent EMRs (Budoff, 1967). Further, the data support the learning potential argument that among these students who are homogeneously grouped by low IQ scores, there is considerable heterogeneity in ability to learn and reason. The data on the psychometric and learning data indicate these differences consistently.

The Binet type of score obtained by the low able nongainer appears to represent a good estimate of his ability to learn and reason. Operationally, he does tend to benefit minimally from learning or reasoning experiences which would seem to be a good definition of a mentally retarded individual. This failure to profit from learning opportunities of some complexity occurred even when the materials were presented in a format which minimizes the need to communicate verbally, which seems to be a serious problem for most school failing low IQ Ss. It represents a major differentiating response, psychometrically, between the high and low able Ss by the learning potential criterion.

The evidence that these learning potential groups do consist of different types of individuals is supported by the frequency with which the high able learning potential Ss (gainers and high scorers) cope more effectively than the low able nongainers on a variety of motivational variables, e.g., self report variables (Harrison and

Budoff, 1969) questionnaire and behavioral reactions to frustration (Pines and Budoff, 1969), reaction to failure (Harrison, Singer, Budoff and Folman, 1969), and some cognitive style tasks (Stroop Color Word, Matching Familiar Figures). When the responses to an interview tapping non-school related areas of adolescents' experiences were compared, there were few differences between special and regular class Ss from similarly poor economic circumstances. The major areas of difference were the distinctly different and inferior quality of responses given by the special class nongainers especially when pressed for detailed responses (Folman and Budoff, 1969; Folman, 1969). The differences between these learning potential groups are not merely reflected in their performance on intelligence tasks. The evidence has lead to the working conclusion that the high able learning potential child is educationally rather than mentally retarded.

A precautionary note, however, is required. While the group differences are clear and consistent when the task is sufficiently complex, there are false positive identifications within the nongainer category. These are of concern since one major objective of this research program is to escape the trap of the single score type of identification which has typified the use of the individual IQ. An alternative is to develop a multi-factor predictive equation by which a judgement of ability is made. These might include cognitive, demographic and motivational variables.

The social data on these community EMRs suggests that severe conditions of social deprivation during or prior to the school ages tends to be associated with a higher proportion of nongainers. Less severe disadvantage, especially when related to lack of good verbal

competence, e.g., non-English-speaking-or-writing parents, or large family membership, results in higher proportions of gainers and high scorers. The more impoverished level of stimulation in the English language, the low skilled level of jobs represented in the homes, and the oft-cited relationship between slower language development, poor verbal competence, and large families seems to result in an accumulation of negative factors reflected in the pattern of low scholastic aptitude scores (Binet-type IQ) and poor school achievement, which culminates in the special class assignment. A learning potential assessment strategy tends to portray these students as more able than their poor school work and low scholastic aptitude score (Binet IQ) indicate, and the post-school adjustment literature tends to support the learning potential derived prediction rather than the Binet IQ derived one. It is interesting to note that post-school adjustment studies regularly tend to indicate that about 2/3 to 3/4 of young adults who had been in EMR classes have attained a satisfactory occupational and social adjustment. According to the learning potential data approximately 2/3 of the Ss above 15 years of age tend to fall in the high able (gainer and high scorer) category.

The trend of the limited social data available suggests support for classifying the gainer and high scorer EMR as socio-culturally disadvantaged, and educationally retarded, rather than intrinsically mentally retarded. However, there may also be a substantial number of nongainers who also have potential for more satisfactory school and/or reasoning performances, except that their prior and present life circumstances have so adversely affected them that they function more generally, i.e., with verbal and nonverbal materials, at levels

which would be predicted for intrinsically mentally retarded persons. They seem to be very inaccessible to new learning, when their present level of responsiveness is plumbed by use of the optimizing procedures employed in the learning potential assessment. It may be that procedures that start by requiring simpler behaviors, and more individual initiative by the child may engage these children in active learning. The upward limits of his performance under these types of conditions would have to be systematically studied.

When middle class students, whether physically damaged or not, appear in special classes, they tend to be nongainers. Further, the social data suggests that these more economically priviledged Ss tend to be placed earlier in special classes. It is likely that they generally can be considered to be damaged, since the psychological trauma of even a mildly retarded pattern of development in a middle class family probably gives rise to considerable psychological pressure that the child must experience. These non-cerebrally involved middle class EMRs are scarce in nonresidential situations, and are presently being collected so their pattern of response may be studied more systematically.

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Footnotes

1. This research was supported in part by Grants 8041 and 10588 from the National Institute of Mental Health, Department of Health, Education and Welfare, and Grant OEG-0-8-080506-4597(032) from the Division of Research, Bureau of the Handicapped, U. S. Office of Education, Department of Health, Education and Welfare.

2. 12 Maple Avenue, Cambridge, Massachusetts, 02139.

3. Instructions for presenting the assessment procedure are available from the author.

4. The Boston samples were drawn from schools located in poorer districts of the city. This probably results in a sample bias toward the low income range, although a recent survey of two middle to upper income suburbs indicated very few undamaged EMRs from middle class homes. We are seeking to systematically assemble a sample of these children without clear evidence of cerebral involvements to determine whether these children do exhibit similar patterns of learning potential status.

5. The institutional population was drawn largely from one state school for the retarded. It consisted of 87 Ss, CA from 10 to 18 years (mean--176.81 months, S.D. 22.88 months); in IQ from 43 to 88 (mean--63.5, S.D. 10.28).

6. In recent years the practice has been to not train or retest high scorers, hence, the marked decline in sample size for the immediate and delayed posttest administrations.

Table 1

Intercorrelation of Designs Correct Scores On Successive Administrations of Kohs Test Series*

		1	2	3	4	(N = 34)
1.	Initial Kohs (K_1)	----	.764	.737	.720	
2.	Immediate Retest (K_2)	.317	----	.876	.866	
3.	Delayed Retest (K_3) (one month later)	.735	.314	----	.934	
4.	Delayed Retest (K_4) N = 29 (six months later)	.735	.836	.914	----	

* Lower left portion of table indicates correlation obtained from post school age institutionalized sample (N = 70); upper right portion, those obtained from community special class EMRs (N = 383).

TABLE 2

Means and Standard Deviations by Learning Potential Status Groups on Selected Social and Test Variables for Community School Age Special Class Children (Including P-Values for Significant Differences between Means) Based on a One-Way ANOVA.

	NONGAINERS			GAINERS			HIGH SCORERS			
VARIABLE	N	MEAN	S.D.	N	MEAN	S.D.	N	MEAN	S.D.	F-VALUES
CA at Kohs Pretest (K_1)	150	165.34	19.86	140	168.98	17.75	80	173.90	16.89	6.378[2]
Social Class	120	3.23	1.85	107	3.23	1.20	66	2.85	1.35	1.425
No. Children in Family	102	4.55	2.29	106	5.49	2.97	58	6.40	3.16	8.948[3]
No. Older Siblings	87	1.76	1.71	90	2.23	2.26	57	3.04	2.67	5.953[2]
No. Younger Siblings	88	1.85	1.96	89	2.36	2.03	55	2.67	2.09	3.335
CA when Placed in Special Class	93	10.25	2.18	89	10.47	2.02	58	10.57	2.10	0.392
No. Years in Special Class	93	3.30	2.17	89	3.27	2.07	58	3.31	2.10	0.005
Latest SB IQ	86	68.78	8.70	90	74.07	5.86	57	75.35	8.02	16.462[3]
2nd Latest SB IQ	82	70.61	8.46	69	75.10	7.78	47	78.15	7.01	14.709[3]
Wechsler Verbal IQ	57	68.23	9.36	40	72.88	7.64	18	75.89	7.35	8.058[3]
Wechsler Performance IQ	63	68.86	12.24	45	80.69	12.48	20	88.80	11.02	26.981[3]
Reading Achievement	65	3.47	1.02	71	3.77	1.06	40	3.34	.81	2.908
Arithmetic Achievement	49	3.74	1.06	48	4.19	1.22	27	4.69	1.02	6.023[2]
Errors, Paired Associates, Forwards	34	37.03	24.11	42	35.45	23.86	9	16.22	14.60	3.008
Errors, Paired Associates, Backwards	33	21.61	19.85	41	18.93	22.41	9	6.22	4.32	2.048
Raven's Matrices (A, B, C, D, E)	121	20.80	8.81	112	26.63	7.73	53	33.41	10.14	27.020[3]
Pretest Kohs Score (K_1)	150	2.34	1.96	140	2.99	1.93	80	10.03	2.38	406.208[3]
Immediate Posttest (K_2)	150	3.57	2.41	140	7.71	2.89	32	12.22	2.56	210.652[3]
Delayed Posttest (K_3)	97	3.51	2.30	103	8.43	3.12	16	12.56	2.16	123.848[3]
Gain (K_2 - K_1)	150	1.23	1.26	140	4.79	2.25	32	3.38	2.11	52.332[3]
Gain (K_3 - K_1)	97	1.36	1.26	103	5.41	2.35	16	3.94	2.02	111.124[3]

1 = $p < .05$, 2 = $p < .01$, 3 = $p < .001$

TABLE 3. Intercorrelations of Selected Social & Test Variables.

	Sex	LP	CA at Initial Kohs	Race	Social Class	No. Child. in Family	No. Older Sibls.	No. Young. Sibls.	S Lives With	No. Acc.& Oper.	CA 1st Placed Sp.C.	No. Yrs.in Sp.C.	Latest IQ
Sex													
LP	-235**												
CA at Initial Kohs	007	165**											
Race	194**	151**	-002										
Social Class	007	069	108	-113*									
No. Child. in Family	012	242**	042	069	-165*								
No. Older Siblings	-058	201**	012	-026	-135	712**							
No. Young. Siblings	024	160*	031	087	-084	612**	-115						
S Lives With	141**	-146**	089	267**	-181**	021	045	012					
No. Accidents & Operations	-074	086	073	-118	-016	-063	-101	-028	-082				
CA 1st placed in Special Class	076	060	243**	115	-205**	044	051	-026	131*	-162*			
No. of Years in Special Class	-062	-011	305**	-139*	206**	-075	-046	-025	-074	227**	-814**		
Latest IQ	-132*	402**	-009	-050	-017	043	034	023	-068	-017	-030	018	
Wisc Verbal IQ	-185*	338**	109	036	-004	-067	-130	-006	-025	016	039	070	822**
Wisc Performance IQ	-130	543**	071	-042	066	099	-020	145	-072	-056	087	-068	919**
2nd Latest IQ	-070	345**	-074	-068	-094	-003	092	-070	-066	-136	131	110	597**
Reading Achievement	212**	011	468**	023	096	-170*	-169*	-067	-074	-036	163*	120	230**
Arithmetic Achiev.	-155	274**	449**	-307	-060	-001	044	-027	-164	136	148	127	299**
Ravens Percentile	025	379**	-127*	-091	-121	-031	-091	082	-031	-068	-081	080	379**
PA - Forward Errors	-079	-163	-195	000	147	-191	-303	-130	-071	-032	-007	029	-153
PA - Backward Errors	-032	-165	-240*	000	097	-117	-325*	090	-060	-036	-111	-050	-167
Initial Testing ($Kohs_1$)	-257**	628**	204**	-088	-123*	182**	151*	130*	-050	018	040	038	404**
Immediate Posttest ($Kohs_2$)	-163**	709**	254**	-036	-089	138*	070	138	-090	105	120	-042	466**
Delayed Posttest ($Kohs_3$)	-163*	729**	254**	-039	-025	103	047	076	-010	069	177*	-130	484**
Gain ($Kohs_2$-$Kohs_1$)	-042	592**	142**	-038	-042	153*	061	131	-140*	181*	095	-041	287**
Gain ($Kohs_3$-$Kohs_1$)	-103	654**	128	-075	-097	106	001	068	-101	121	117	-119	352**

* = $p < .05$, ** = $p < .01$

TABLE 3 CONT'D. Intercorrelations of Selected Social & Test Variables.

	Wisc Verbal IQ	Wisc Perfor. IQ	2nd Latest IQ	Read. Achieve	Arith. Achieve	Ravens %tile	PA Forword Errors	PA Backwd Errors	Init. Test. Kohs 1	Immed. Postest Kohs 2	Delayd Postest Kohs 3	Gain Kohs 2-Kohs 1	Gain Kohs 3-Kohs 1
Sex													
LP													
CA at Initial Kohs													
Race													
Social Class													
No. Child. in Family													
No. Older Siblings													
No. Young. Siblings													
S Lives With													
No. Accidents & Operations													
Latest IQ													
Wisc Verbal IQ													
Wisc Performance IQ	534**												
2nd Latest IQ	648**	523**											
Reading Achievement	256*	192	222**										
Arithmetic Achiev.	269	213	348**	531**									
Ravens Percentile	320**	603**	354**	153	191								
PA - Forward Errors	-196	-075	-126	045	-161	-106							
PA - Backward Errors	-286	000	-169	-050	-211	-129	678**						
Initial Testing ($Kohs_1$)	353**	616**	357**	-050	238**	464**	-227*	-205					
Immediate Posttest ($Kohs_2$)	380**	680**	337**	114	222*	440**	-214*	-134	764**				
Delayed Posttest ($Kohs_3$)	271*	722**	324**	185	121	455**	-218	-164	737**	876**			
Gain ($Kohs_2$-$Kohs_1$)	188	396**	171*	213*	220*	228**	-075	023	105	721**	571**		
Gain ($Kohs_3$-$Kohs_1$)	178	562**	238**	274**	147	310**	-062	-005	146*	570**	776**	723**	

* = $p < .05$, ** = $p < .01$

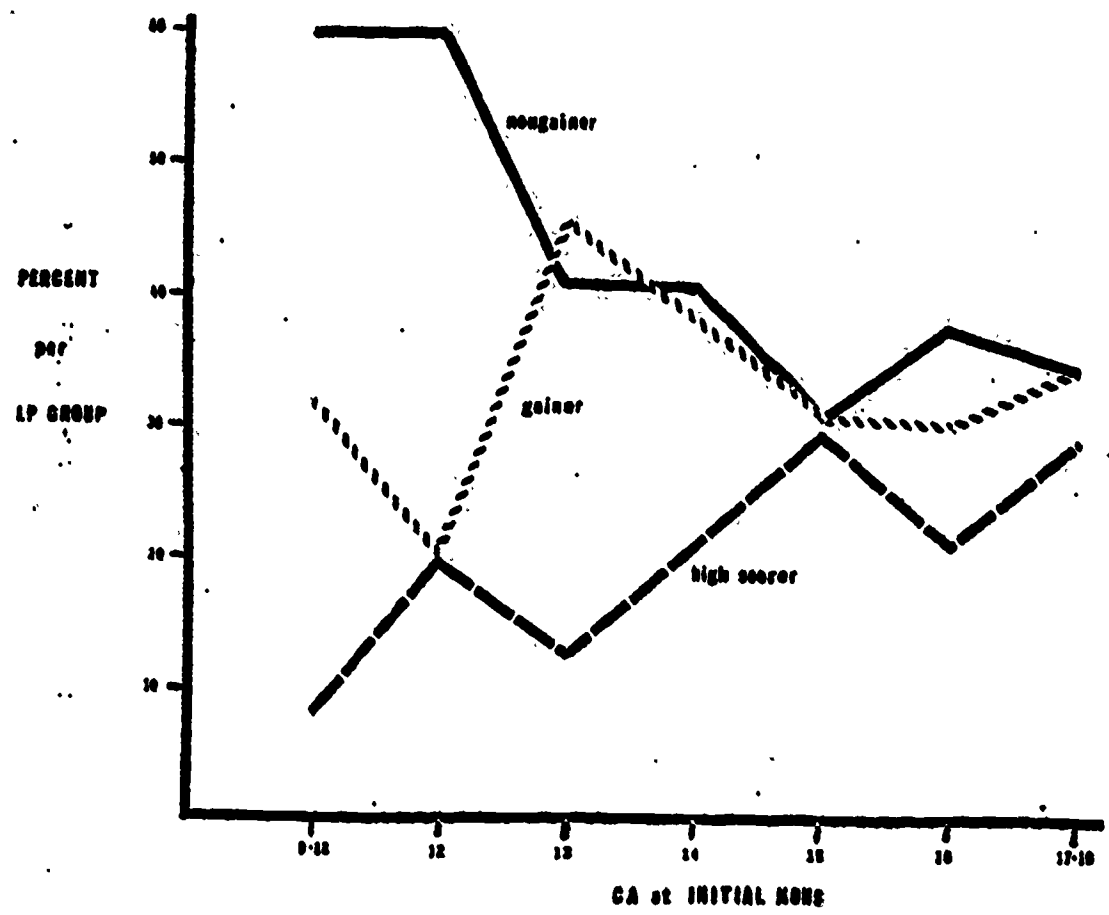
Figure Captions

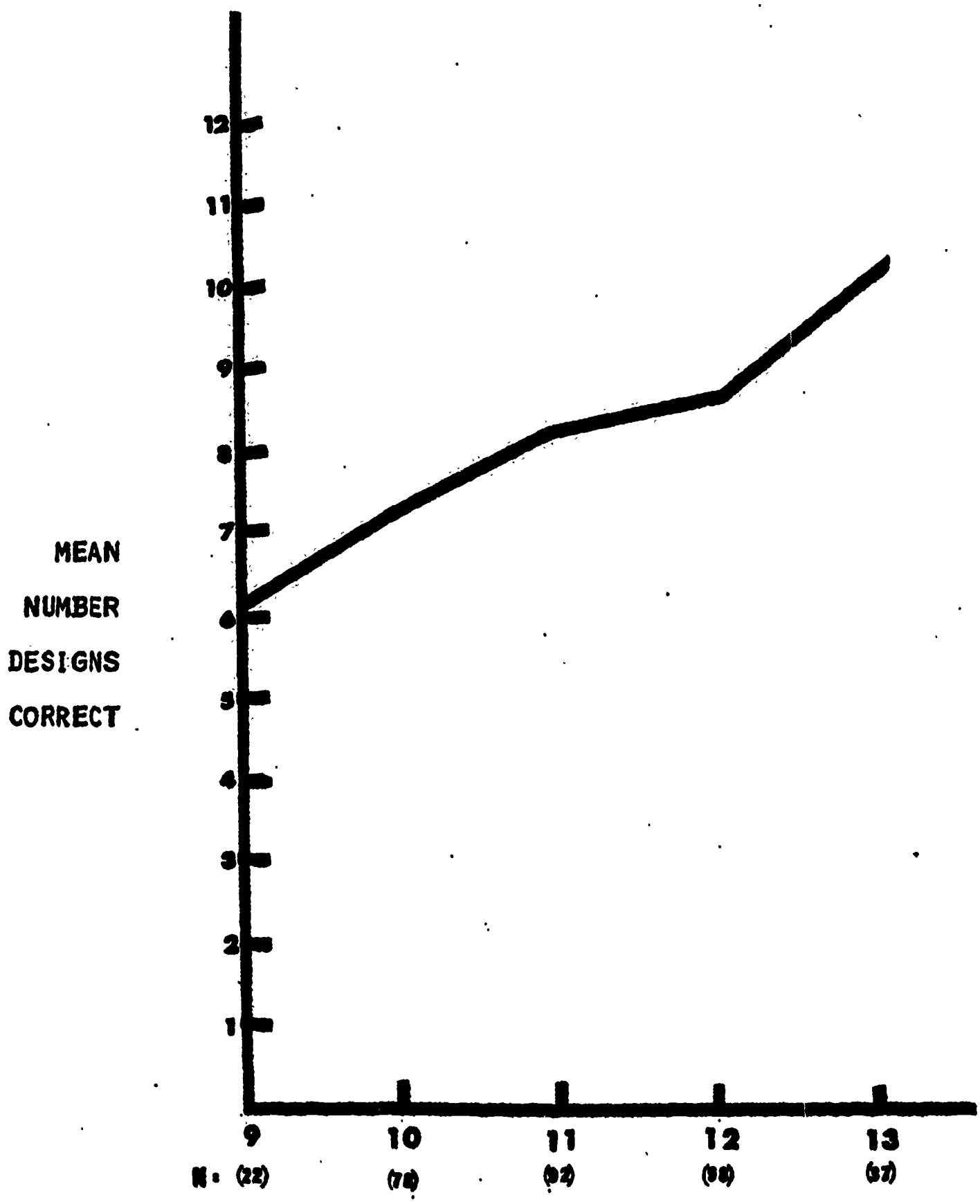
Figure 1. Percentage distribution by learning potential status of special class students (N = 383).

Figure 2. Mean number block designs correct for regular class children (CA 9-13) from low socio-economic backgrounds.

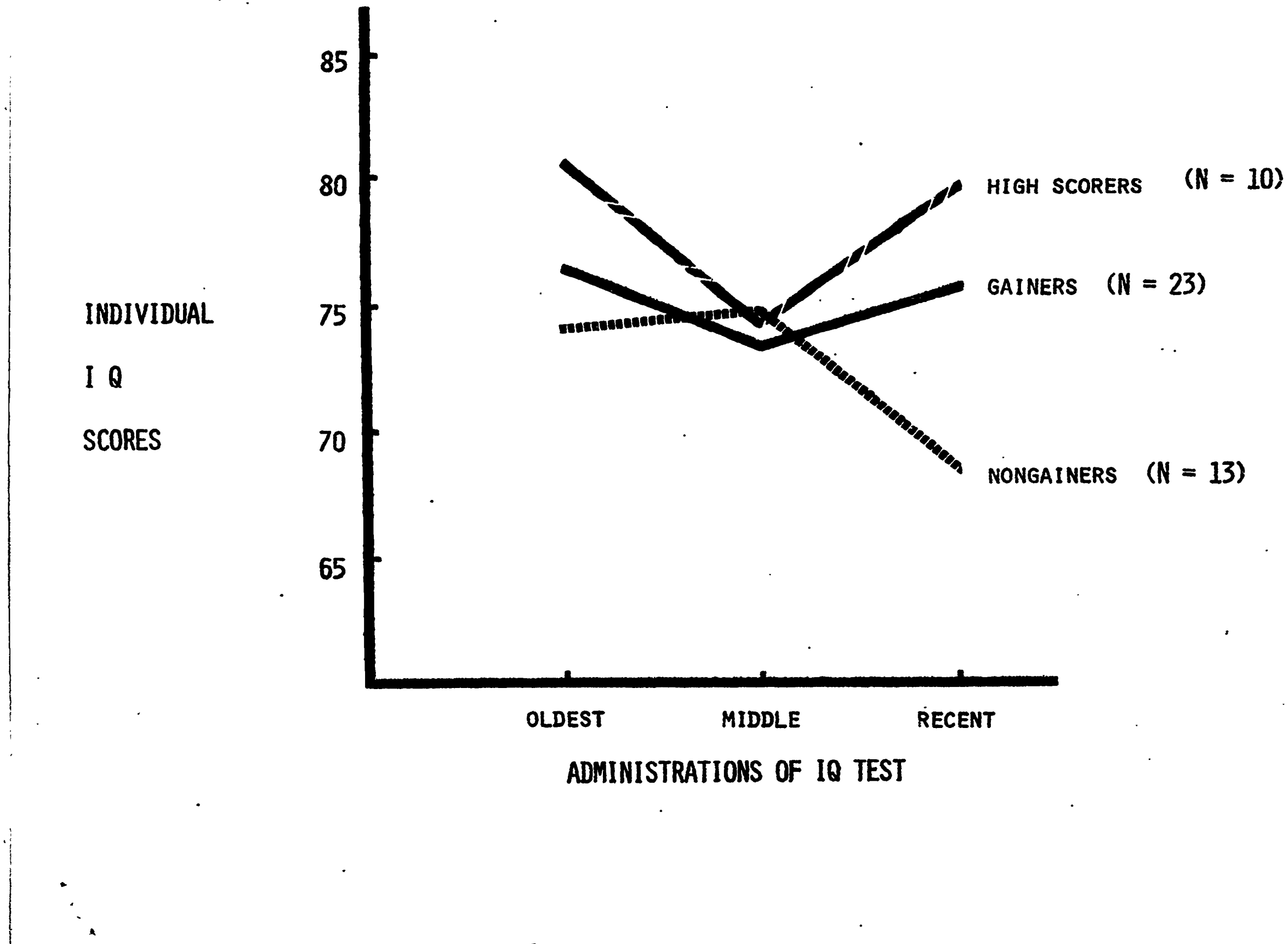
Figure 3. Mean individual IQ scores for three tests administered the same Ss.(LP status, F = 5.878, p <.005. No differences by test administration, or the interaction)

Figure 1. Percentage distribution by learning potential status of special class students (n = 383).





(Normative Kohs, 1969)


INDIVIDUAL
I Q
SCORES
85
80
75
70
65
HIGH SCORERS (N = 10)
GAINERS (N = 23)
NONGAINERS (N = 13)
OLDEST
MIDDLE
RECENT
ADMINISTRATIONS OF IQ TEST